PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements relating to Thermoplastics Limbs for Dolls

I, TSENG KUEN of 31, San Shan Road, Second Floor, Kowloon, Hong Kong, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to the manufacture of doll's limbs which are bendable, but non-resilient, so that they stay in the positions to which they are bent. In particular the invention relates to limbs for small dolls which are made by moulding a flexible thermoplastics material around non-resilient metal wires which hold the limbs in the positions to which they are bent.

Although it is not particularly difficult to make dolls of this kind with non-human appearance there are acute difficulties when attempting to utilize this principle when dolls have human-shaped limbs intended to bend at positions corresponding to human arm and leg joints. This difficulty arises because the limbs terminate in fingers or toes and the intermediate joint portions of the limbs are only marginally thicker than the wires themselves. It is essential for satisfactory appearance that the wire is completely covered by the thermoplastics material and the location of the wire within the mould sufficiently accurately for this is difficult.

According to one aspect of the invention a method for making a thermoplastics limb for a doll in a mould having separable parts which when together define a cavity of the required limb configuration comprises positioning a wire of non-resilient magnetic material within the cavity, at least one end of the wire projecting beyond the end of the mould, holding the wire in position by engagement of the projecting end by a magnet, injecting molten thermoplastic material into the cavity to surround the wire, allowing the thermoplastic material to set, and withdrawing the completed limb from the mould.

According to another aspect of the invention a mould for making a thermoplastics limb for a doll comprises two mould parts having depressions such than when the mould parts are together they define at least one cavity having the required limb configuration, a groove extending longitudinally from the ends of such depressions in at least one of the mould parts to receive a length of straight magnetic wire, at least one end of which may project beyond the end of the two mould parts, a magnet being positioned at one or both ends of the mould parts to hold at least the projecting end of a wire, means being provided for locating the length of wire on the mould part which is associated with the magnets. Whether the mould is employed in a vertical position or a horizontal position it may be sufficient to provide a magnet at one end only (the top end if the mould is vertical). The other end of the wire may be held by another magnet or by other locating means.

For convenience, the mould parts define cavities for more than one limb, two or more of such cavities being aligned so that a common wire may be positioned within them. It is preferred that between longitudinally adjacent cavities there are locating pins mounted to project from one mould part and accommodating sockets for the pins in the other mould part. Preferably at least some of the pins are disposed immediately adjacent the path of the wire to constitute guides for the wire. Further support and guidance for the wire may be provided by split pegs in which the wire is located.

One embodiment of the invention will hereinafter be described with reference to the drawing accompanying the Provisional Specification, of which the sole figure is a pers-

[*Price*

pective view of one part of a mould in accordance with the invention.

Referring to the drawing, the mould comprises a plate 1, with depressions 2 which correspond with the halves of the limbs appropriate to that mould plate. It will be understood that there is another mould plate adapted to co-operate with plate 1 and having depressions which, with depressions 2, define cavities appropriate to the shape of the doll limbs. Conveniently in each operation the mould makes two sets of limbs, each set comprising two arms and two legs. The two arms and two legs of each set are arranged so that they can be inserted, without separation, into the body of a doll. Alternatively, however, it may be required that the arms and legs be separated before insertion in the body of the doll.

From plate 1 there projects perpendicularly six pins 3, and at the top and bottom of the plate two pegs 4. The pegs have slots aligned with the centre lines of the limbs. The pins 3 are disposed immediately on either side of the centre lines of the limbs, and along said centre lines at the ends of the depressions there are straight grooves in the face of the plate, the whole arrangement being adapted to accommodate two straight wires 5 which are bedded in the grooves, housed in the slots in pegs 4 and located between pins 3, being thereby constructed to lie along the centre lines of the limbs. In the other mould plate there are corresponding holes for the pins 3 and pegs 4 and grooves to accommodate the wires 5. It will be seen that grooves to receive the wires may altrnatively be formed in one only of the mould parts, either the illustrated plate or the plate not shown in the drawings.

The wires are supported in place by means of a permanent magnet 6 mounted at the top ends of the plate 1, the wires being soft iron wire. The length of wire is cut, threaded through pins 3, engaged in split pegs 4 and the top end engaged magnetically by the magnet 6. This provides a particularly easy way of mounting the wires and prevents risk of misalignment of the wires.

With this arranged the wires are place in position as shown, the two mould parts drawn together and thermoplastics material injected into the mold cavities through nozzles 7. When the material has set the wires lie axially within the limbs and are cut off at the ends of the limbs. The thermoplastic material used may be polythene injected at a temperature of between 160°—250° F. The wire is preferably three-stranded twisted mild steel wire.

The depth of the cavities 2 at the positions which correspond to the elbow of an arm or the knee or a leg are only slightly greater than the thickness of the wire to ensure that the limb shall be bendable at these points. The neighbouring parts of the limbs are thicker so as to confine the bending to that part of the arm or leg which a human person can bend.

The invention is not restricted to the details of the foregoing description of one embodiment thereof. For example, it may be preferred to make the mould with, instead of two sets of cavities (each set being for two arms and two legs), only one set or perhaps three or more sets.

WHAT I CLAIM IS:—

1. A method for making a thermoplastic limb for a doll in a mould having separable parts which when together define a cavity of the required limb configuration comprising positioning a wire of non-resilient magnetic material within the cavity, at least one end of the wire projecting beyond the end of the mould, holding the wire in position by engagement of the projecting end by a magnet, injecting molten thermoplastic material into the cavity to surround the wire, allowing the thermoplastic material to set, and withdrawing the completed limb from the mould.

2. A mould for making a thermoplastics limb for a doll comprising two mould parts having depressions such that when the mould parts are together they define at least one cavity having the required limb configuration, a groove extending longitudinally from the ends of such depressions in at least one of the mould parts to receive a length of straight magnetic wire, at least one end of which may project beyond the ends of the two mould parts, a magnet being positioned at one or both ends of the mould parts to hold at least the projecting end of a wire, means being provided for locating the length of wire on the mould part which is associated with the magnets.

3. A mould as claimed in claim 2 wherein the mould parts define cavities for more than one limb, two or more of such cavities being aligned so that a common wire may be positioned within them.

4. A mould as claimed in claim 3 wherein, between longitudinally adjacent cavities there are locating pins mounted to project from one mould part and accommodating sockets in the other mould part for the pins.

5. A mould as claimed in claim 4 wherein at least some of the pins are disposed immediately adjacent the path of the wire to constitute guides for the wire.

6. A mould as claimed in any of claims 2 to 5 wherein split pegs are provided in which to locate the wire.

7. A method for making a thermoplastics limb for a doll substantially as hereinbefore described with reference to the drawing accompanying the Provisional Specification.

8. A mould for making a thermoplastic limb for a doll substantially as hereinbefore described with reference to the drawing accompanying the Provisional Specification.

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1070705 PROVISIONAL SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*